

Ministry
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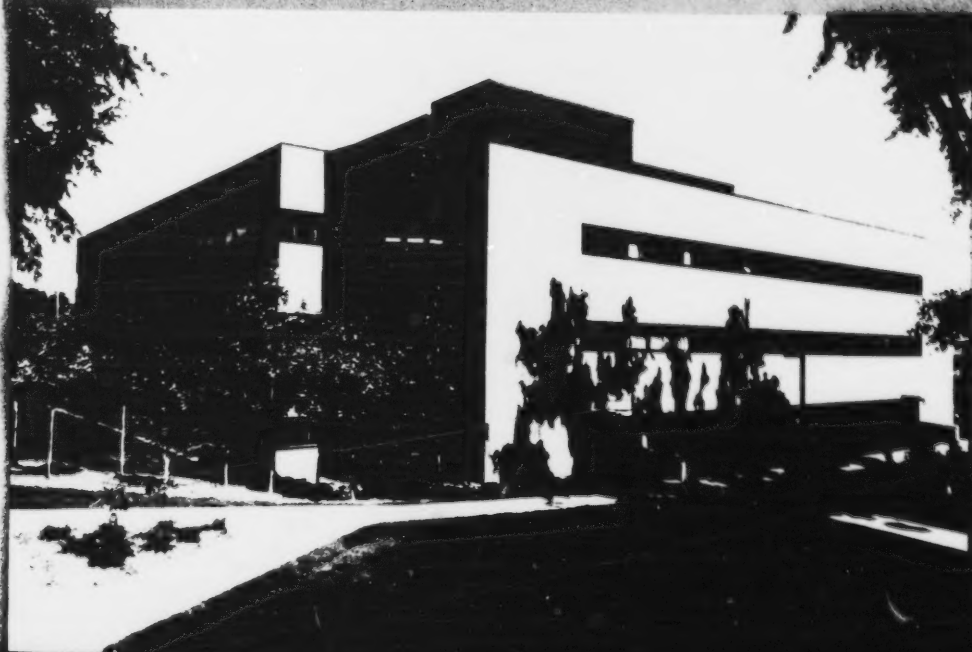
Canadian
Forestry
Service

Service
canadien des
forêts

PROGRAM REVIEW

Great Lakes Forestry Centre

1985-86



86-06712/

PROGRAM REVIEW

GREAT LAKES FORESTRY CENTRE

CANADIAN FORESTRY SERVICE

GOVERNMENT OF CANADA

1985-86

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THE CANADIAN FORESTRY SERVICE

GOVERNMENT OF CANADA

The Canadian Forestry Service (CFS) is the principal source of federal expertise in forestry. Its general objective is to promote the wise management and use of Canada's forest resources for the economic, social, and environmental benefit of Canadians.

The following are the main functions of the CFS:

1. coordination of federal policies, for the promotion of better resource management and forest industry development;
2. provision of scientific and technological leadership in forestry through research and development;
3. Provision and analysis of national and international statistics and information as a basis for policy formulation;
4. development and certification of codes and standards for wood product performance;
5. protection of Canada's forests from foreign pests;
6. fostering the potential use of the forest resource for energy;
7. contributing to the environmental objectives of the government of Canada.

A number of federal agencies are involved in forestry programs and a Federal Forest Sector Strategy Committee has been established to coordinate federal forestry activities. The CFS has been designated the lead agency.

The CFS comprises a headquarters unit, six forestry centres, and two national institutes. The forestry centres are responsive to regional priorities and maintain close liaison with the respective provincial government forestry departments and other clients. They also participate in, and frequently lead, national programs. The national institutes provide the focus for programs of national scope.

SERVICE CANADIEN DES FORÊTS
GOUVERNEMENT DU CANADA

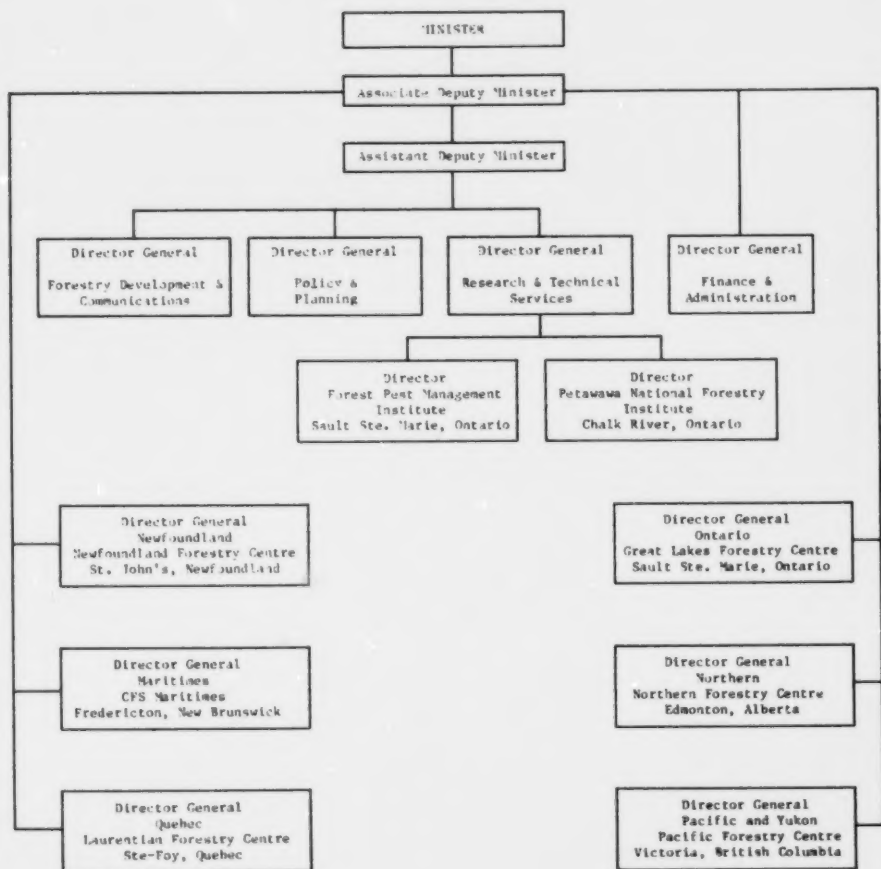
Le Service canadien des forêts (SCF) réunit la majorité des spécialistes fédéraux en foresterie. Son objectif général est de promouvoir l'aménagement et l'utilisation judicieuse des ressources forestières du Canada pour le plus grand bien économique, social et environnemental des Canadiens.

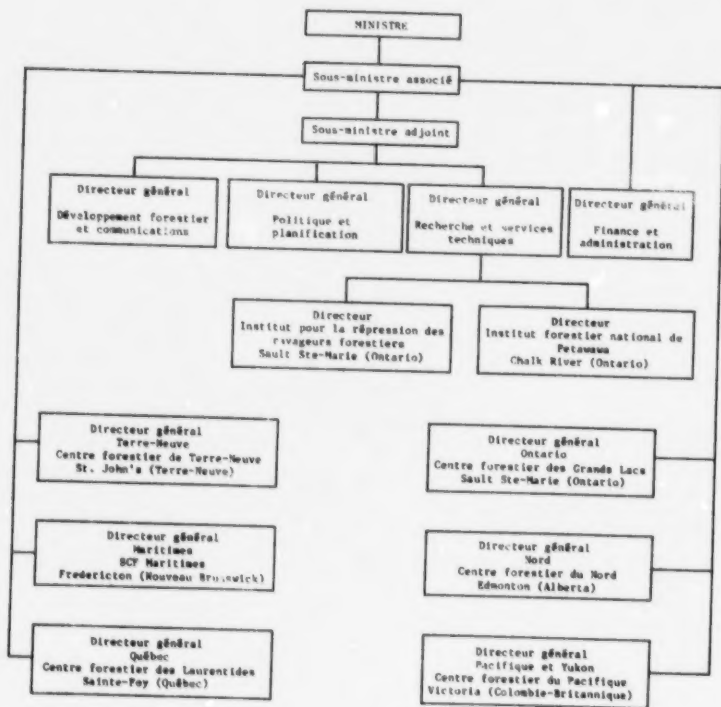
Voici les principales fonctions du SCF:

1. coordonner les politiques fédérales afin de favoriser l'amélioration de la gestion des ressources et l'expansion de l'industrie forestière;
2. fournir une orientation scientifique et technologique dans le domaine de la foresterie, par la recherche et le développement;
3. fournir et analyser les statistiques et l'information nationales et internationales qui serviront à établir les politiques;
4. mettre au point et homologuer des codes et des normes en matière de rendement des produits du bois;
5. protéger les forêts canadiennes en luttant contre les ravageurs étrangers;
6. parrainer l'utilisation éventuelle des ressources forestières pour la production d'énergie;
7. adhérer aux objectifs environnementaux du gouvernement fédéral.

Divers organismes fédéraux participent aux programmes forestiers, et un comité stratégie forestière fédérale a été créé pour coordonner les activités fédérales en matière de foresterie. Le SCF a été désigné organisme directeur.

Le SCF comprend une administration centrale, six centres forestiers et deux instituts nationaux. Les centres forestiers doivent répondre aux impératifs régionaux et entretenir une liaison étroite avec les ministères provinciaux des Forêts. Ils participent également à des programmes nationaux dont ils assument fréquemment la direction. Les instituts nationaux sont les foyers des programmes d'envergure nationale.





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Chief Implementation Officer: D.W.J. McGowan



FOREWORD

The Great Lakes Forestry Centre (GLFC), located in Sault Ste. Marie, Ontario, is one of six regional forestry centres operated by the CFS. The Service provides federal leadership and a national focus in the forest sector for the continuing economic, social and environmental benefit of Canada. The main activities of the Service include research and technology transfer, forest resource development through federal-provincial forestry agreements, forest resource data, industry, trade and economics, promotion of the management of federal forest lands, international forestry, human resources planning and public awareness. GLFC is responsible for CFS programs in Ontario.

Two Program Directors are responsible for the management of our forestry programs. The Program Director for Forestry Development is R.A. Haig, who also serves as Deputy Director General. The Program Director for Research and Technical Services is C.R. Sullivan. Responsibility for financial and administrative services and for facilities is with the Regional Manager, Management Services, M.J. Parent and for information and library services is with the Chief, Communications Services, C.A. Plexman.

Our research program includes three subprograms: forest resources, forest protection and environmental forestry. These deal directly with the issue of maintaining the resource supply, through research aimed primarily at increasing regeneration and reducing losses but also at increasing yields per hectare and utilization. In combination with this work, we are directing our research toward the maintenance of a quality environment. Our activities range from basic to applied and developmental research and include a significant element of technology transfer to our major clients. Within our three subprograms we have identified nine projects, each of which comprises discipline-oriented studies.

Major activities in forestry development include the federal management responsibilities for federal-provincial forest management agreements, management of forestry job creation programs, participation in the National Forestry Statistics program, and forest economics research.

Much of our research is carried out in cooperation with the province of Ontario. Under a Canada-Ontario agreement, a Canada-Ontario Joint Forestry Research Committee (COJFRC) is responsible for coordinating, planning and implementing forest research programs carried out by both governments.

During the year, a Great Lakes Forestry Centre Advisory Committee was established with representation from forest industry, the provincial government, universities and non-governmental associations. The Committee is chaired by John Iverson, Manager of Forestry - Ontario, Dometic Forest Products and has held

three meetings. Its first action has been to undertake a preliminary review of forest research priorities and needs within the province. Our mechanization of silviculture project continues to be guided by a national advisory committee on mechanization.

The 1985-86 Program Review outlines our accomplishments for the year and our major goals for 1986-87. Considerable attention was directed to the management of the Canada-Ontario Forest Resource Development Agreement (COFRDA). The major emphasis of COFRDA is on forest renewal and stand tending operations, and major outputs to date include 82,000 ha of forest renewal, 12,000 ha of intensive forest management operations, and the purchase of 54 million container seedlings. By year end, \$80 million of the total \$150 million were committed and total expenditures were \$37 million. Meanwhile, the Forest Management Subsidiary Agreement terminated on 31 March 1986, following the second of two pay-out years.

The Great Lakes Forestry Centre/Forest Pest Management Institute building expansion program continued during the year. Phase II additions to the laboratory complex and administrative wing were completed; Phase III renovations within the existing laboratory complex were begun.

During the year, GLFC cooperated with Employment and Immigration Canada in the administration of the forest sector component of the Job Development Program (JDP). During 1985-86, 56 projects were approved and 600 people were employed for about 14,000 work weeks, at a total cost of \$5.8 million. Most projects dealt with stand tending operations such as thinning, pruning or release from competition.

Once again, GLFC participated in National Forest Week, with a tree planting ceremony in the arboretum, displays at two city malls, and distribution of promotional materials to local schools. During the year, staff of the Centre played leading organizational roles in the COJFRC Symposium on Site Classification in Relation to Forest Management and in a IUFRO Symposium held in Alberta that dealt with operational aspects of stand establishment. Liaison continued with the School of Forestry, Lakehead University, the Faculty of Forestry, University of Toronto and the North Central Forest Experiment Station, U.S. Forest Service. Annual meetings were held with each agency, GLFC staff participated as Adjunct Professors, as guest lecturers and as graduate student advisors with the two universities and there was mutual participation in project reviews with the North Central Forest Experiment Station. In 1985-86 an agreement was signed with the Forest Engineering Research Institute of Canada concerning our respective roles in mechanization of silviculture.

During the year, 5-year operational plans were prepared for each of our projects and a draft of a long-term strategic plan was prepared. Triennial project evaluations were held for mechanization of silviculture, forest pathology and long-range transport of air pollutants research projects.

Total expenditures in 1985-86 were \$24,934,100 and the full-time staff was 180.

Several personnel changes occurred. C.A. Barnes, Forest Insect and Disease Survey Technician, passed away, while L.J. Koivisto and E.J. Steinke, Shift Engineers, A. Willis, Office Processing Systems Operator, and R. Broadbent, Forest Pathology Technician, retired. S. MacLeod, Horticulture and Grounds Maintenance Technician, was transferred to the Forest Pest Management Institute. Staff members who resigned were G.M. Wickware, Land Resource Scientist, D.P. Webb, Research Scientist and E.B. Dorworth, Survey Mycology Technician. Joining the staff during the year were T.J. Lysyk, Research Scientist, F.J. Heatley, Head, Maintenance and Construction and D. Ortiz, Information Officer. During the year C.E. Dorworth, Research Scientist, was on secondment to the Pacific Forestry Centre.

J.H. Cayford
Director General
Great Lakes Forestry Centre
31 March 1986

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Forest Environment Research



IMPACT OF LONG-RANGE TRANSPORT OF AIR POLLUTANTS ON THE
BIOGEOCHEMISTRY OF FOREST ECOSYSTEMS

Professional Staff: N.W. Foster (Project Leader), G.D. Hogan, J.A. Nicolson,
R.D. Whitney, I.K. Morrison

Support Staff: L.M. Chartrand, P.W. Hazlett, R.I. Irwin, A.W. Johns,
D.J. Kurylo, D. Ropke

Objectives

To elucidate the influence of atmospheric deposition of acidifying substances on tree form and function, tree diseases, nutrient cycles and hydrologic processes in Ontario forests.

Achievements

Completed a fifth year of uninterrupted measurement of water quality within 20 terrestrial sub-basins at Turkey Lakes Watershed; completed a facility for carrying out studies on the physiological effects of acid rain; determined ion transport through the soil at two sites in the watershed; continued field experiments to test the effect of simulated rain of various acidities on *Armilaria* root rot inoculated in young balsam fir trees; published three journal articles and made five presentations at scientific conferences.

Goals for 1986-1987

To participate in the annual Air Pollution Workshop sponsored by Argonne National Labs, Chicago, Ill. and the Turkey Lakes Watershed Workshop, Sault Ste. Marie; to report on ion budgets for terrestrial watersheds, temporal and spatial variation in streamwater chemistry in the Turkey Lakes Watershed; to carry out growth chamber experiments aimed at determining the morphological and physiological effects of simulated acid rain on native hardwoods; to apply simulated acid rain to trees protected from rain and monitor disease development on *Armilaria*-inoculated and untreated trees.

Forest Production Research



BLACK SPRUCE ECOSYSTEM SILVICULTURE

Professional Staff: R.A. Sims (Project Leader), R.L. Fleming, A. Groot,
V.F. Haavisto, J.K. Jeglum, B. Payandeh

Support Staff: M.J. Adams, G.T. Atkinson, G.J. Koteles, D. Mossa, R.M.
Siltanen, S.J. Taylor

Objectives

To develop a classification system for black spruce ecosystem types in Ontario for forest management purposes; to determine if modified cutting and direct seeding are feasible alternatives to clearcutting and planting for regenerating black spruce; to determine the feasibility of intensive treatments such as drainage and fertilization to increase productivity on black spruce peatlands; to determine the impact of current forest management practices on black spruce ecosystems.

Achievements

Undertook a third year of field programs in a cooperative CFS-Ontario Ministry of Natural Resources (OMNR) forest ecosystem classification (FEC) and worked at refining soil and vegetation classes for Ontario's North Central Region; continued analyses and reports on growth and yield data for peatland black spruce and spruce-fir forests; continued investigations of direct seeding on upland and lowland sites, the effects of site preparation on upland sites, advance growth on peatlands, conifer seed treatments to delay or speed up the effects of germination, growth and yield and cone and seed production; undertook black spruce spacing and thinning trials, and initiated microenvironmental research on seedbeds; continued to cooperate with OMNR in a pilot forest drainage experiment.

Goals for 1986-1987

To analyze and interpret FEC data from the Clay Belt and North Central Region studies, and to finalize and test a field-based classification system for the North Carolina Region; to remeasure trials for advance growth and seeding studies; to continue microenvironmental studies of seedbed microsites so as to improve understanding of seedling growth and survival; to continue black spruce spacing and precommercial thinning trials; to continue environmental studies in OMNR's Wally Creek forest drainage area; to conduct a workshop on the Nipigon strip-cut studies; to continue work on cone and seed production, conifer seed treatments, growth and yield, boreal forest site, and peatland forestry; to transfer knowledge and technology related to black spruce management to foresters and the general public.

MECHANIZATION OF SILVICULTURE

Professional Staff: C.R. Smith (Unit Head), J-D. Leblanc, B.J. Sutherland

Support Staff: F.F. Foreman, D.J. Kennington, J. Richenhaller

Objectives

To develop biologically sound mechanized techniques for the efficient and effective conduct of silvicultural operations in Canada; to develop and maintain contacts in Canada to promote and foster the application of mechanized silvicultural techniques.

Achievements

Published reports on the effect of full-tree and tree-length harvesting on the performance of three light scarifiers, site preparation with the Donaren 180D powered disc trencher on full-tree logged sites in cooperation with the University of Toronto and black spruce seed distribution with the Brohm Seeder in cooperation with staff of the GLFC Black Spruce Ecosystem Silviculture Project; conducted a study on the effect of overwintering on mounds produced by the Brücke Moulder on compact silt soils; initiated the evaluation of site preparation by the Great Lakes Forest Products powered scarifier; assisted in the organization of an International Union of Forestry Research Organizations (IUFRO) working party meeting to consider current research developments with respect to mechanized stand establishment; initiated the formation of a Precommercial Thinning Working Group for Eastern Canada aimed at improving thinning operations in balsam fir stands; published two issues of the Mechanization of Silviculture Newsletter.

Goals for 1986-1987

To publish a standard assessment procedure for evaluating silviculture equipment; to conduct an evaluation of the Tetra automatic tree planter from Finland; to conduct evaluations of site preparation equipment in conjunction with CFS Forestry Development staff of the Northern Forestry Centre; to conduct evaluations of a site preparation tool in conjunction with the North Central Forest Experiment Station of the U.S. Forest Service.

REFORESTATION SILVICULTURE

Professional Staff: F.W. von Althen (Project Leader), J.B. Scarratt,
R.F. Sutton, J.E. Wood, B. Payandeh

Support Staff: B.R. Canning, F.W. Curtis, D.L. Maries, E.G. Mitchell,
T.P. Weldon

Objectives

To develop regeneration methods and associated tree-growing techniques for efficient and effective stand establishment and treatment; to develop biologically sound techniques for conducting silvicultural operations in Canada.

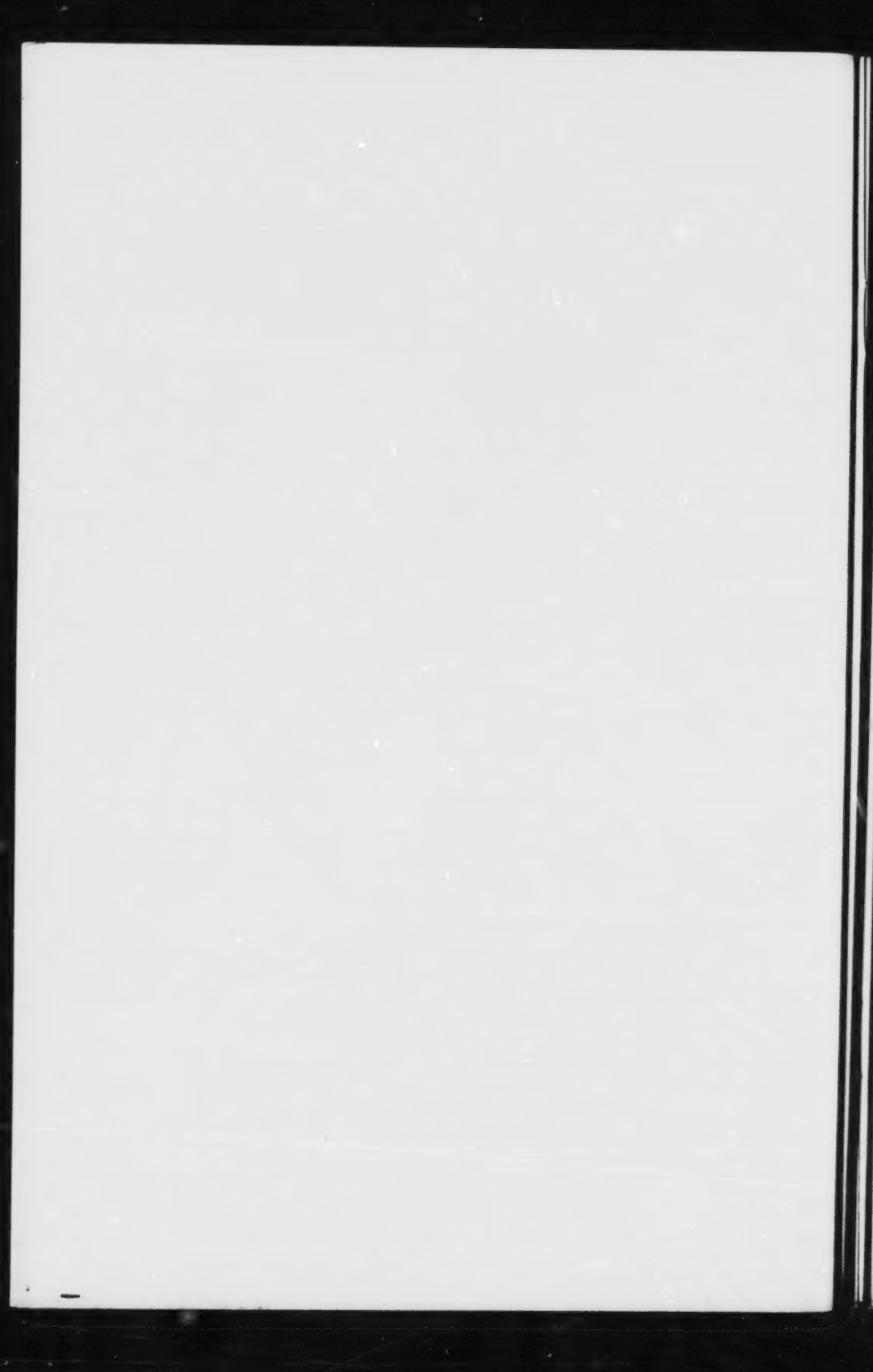
Achievements

Published a report on the comparative field performance of coniferous bare-root and paperpot jack pine, white spruce and black spruce planting stock; published a report on planting season extension of cold-stored and fresh-planted black walnut, red oak and silver maple seedlings; completed an analysis of data on the establishment of coniferous plantations in the boreal forest by conventional planting of bare-root stock; published a report on the effect of spacing on the 10-year survival and growth of planted black walnut, white ash and silver maple trees; completed extensive review and synthesis of literature on regeneration in Ontario as a prelude to developing a model for artificial regeneration in the province.

Goals for 1986-1987

To prepare a detailed problem analysis for reforestation silviculture in Ontario; to analyze data and publish a report on the effects of mowing and chemical weed control on walnut growth; to prepare a paper on root-growth capacity, field root growth and field performance for the Roots in Forest Soil Symposium to be held in Victoria, B.C.; to prepare a final report on the biological results of aerial dart outplanting experiments; to complete the final outplanting experiment with hydrophilic polymers and prepare a report on their use in the production and planting of containerized seedlings; to apply granular hexazinone in winter on shearbladed strips and measure response to black spruce planted in the treated strips; to develop sub-models of survival and growth of planted black spruce, white spruce and jack pine.

Forest Protection Research



FOREST FIRE RESEARCH

Professional Staff: B.J. Stocks (Unit Head), T.J. Lynham, D.J. McRae

Support Staff: T.W. Blake, G.R. Hartley, J.A. Mason

Objectives

To coordinate GLFC fire research activities as part of Ontario's fire management program and participate in the CFS national program; to develop improved pre-suppression techniques by means of fuel-specific fire behavior models for major fuel types and by performance analysis and calibration of the Canadian Forest Fire Danger Rating System for Ontario conditions; to determine the ecological effects of prescribed fire and wildfire on forest ecosystems and relate these to fire behavior parameters.

Achievements

Continued investigations of fire growth from a point-source ignition through experimental burning in both immature jack pine and jack pine slash; participated in a CFS cooperative national experimental burning project in northern Alberta; provided assistance to the People's Republic of China by visiting China and analyzing fire weather and fire report data to ascertain the suitability of the Canadian Forest Fire Danger Rating System for that country; in conjunction with other CFS fire researchers, continued to work on an improved system to predict forest fire behavior in Canada; reported on fire behavior in immature jack pine, people-caused fire occurrence in Ontario, fire potential in budworm-damaged forests in Ontario, and crown fire spread rates in immature jack pine.

Goals for 1986-1987

To complete an expanded program of point-source ignition experimental fires in both immature jack pine and jack pine slash; to complete analysis and report on the suitability of the Canadian Forest Fire Danger Rating System for use in north-eastern China; to continue participation in the CFS national burning project in northern Alberta; to develop a computerized data bank on fuels and fire behavior data on all OMNR operational prescribed burns; to continue participation in the CFS Fire Danger Group producing an improved Canadian Forest Fire Danger Rating System; to cooperate with U.S. and Canadian atmospheric scientists interested in studying mass-fire behavior of large-scale Ontario prescribed burns for nuclear winter hypothesis evaluation purposes; to initiate, under a COFRDA

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contract, a study of fuel loadings and fuel arrangement in natural forest stands in Ontario; to report on fire behavior in mature jack pine, vegetation succession after fire in experimentally burned standing timber fuel types, regeneration success on well-documented Ontario wildfires, crown fire propagation in mature and immature jack pine, and the behavior of fires in spruce-lichen woodlands in the Northwest Territories.

DEVELOPMENT AND APPLICATION OF CONCEPTS IN FOREST ENTOMOLOGY IN ONTARIO

Professional Staff: D.R. Wallace (Project Leader), G.T. Harvey, D.B. Lyons,
T.J. Lysyk, V.G. Nealis, C.J. Sanders

Support Staff: Z.M. Faux, S. Fera, R.M. Fletcher, G.S. Lucuik, D.L.
Oliver, P.M. Roden

Objectives

To acquire a sound understanding of the processes involved in regulating insect populations and provide information required by forest managers to cope with pest problems; to develop economically acceptable and environmentally safe methods for limiting forest pests, and to demonstrate the applicability of such methods to forest management in Ontario.

Achievements

Continued detailed field investigations of survival of spruce budworm populations to identify key mortality factors; continued studies of the phenology and behavior of spruce budworm parasitoids, especially *Apanteles fumiferanae*; made observations on the flight and dispersal of spruce budworm adults, using aerial trapping and laboratory experimentation; continued the isozyme analysis of spruce budworm populations and other forest insects; took final bird census in a 20-year study of birds in relation to spruce budworm populations at Black Sturgeon Lake; field-tested a synthetic sex pheromone for trapping males of the jack pine budworm; initiated studies on the parasitoids of the jack pine budworm; established a technique for continuous rearing of budworm parasitoids; continued investigations on the effects of meteorological variables on the phenology of the pine false webworm and developed predictive models; continued taxonomic study of a new species of *Olesicampe* from the pine false webworm; investigated the phenology of the introduced pine sawfly and its parasitoid complex; carried out preliminary propagation studies of *Ceranthia samarensis*, a newly recognized parasitoid of the gypsy moth from Europe, in preparation for its release in Ontario; completed identification of gypsy moth egg parasitoids; completed a review of literature on behavior and development of the white pine weevil; carried out the biological assessment of an aerial release of *Trichogramma minutum* against the spruce budworm.

(continued)

Goals for 1986-1987

To continue detailed field investigations of survival of spruce budworm populations; to initiate field and laboratory studies of diapause termination in spruce and jack pine budworm and to develop and test a model for spring emergence of second-instar budworm; to develop further models of temperature-dependent development of spruce and jack pine budworm; to develop sampling methods for the jack pine budworm; to complete the phenology study of *Apanteles fumiferanae*; to complete work on the relationship of spruce budworm pathogens and parasitoids; to initiate studies of budworm parasitoid life histories and behavior; to prepare 20-year bird census data for publication; to continue field and laboratory studies of flight and dispersal of spruce budworm adults; to develop new studies on insect semiochemicals; to complete studies of interpopulational differences in the spruce budworm; to continue isozyme studies of the differentiation of western North American budworm species and other forest insects; to continue ecological studies of the pine false webworm and complete Ph.D. dissertation on this topic; to publish a description of new *Olesicampe* species; to publish findings on the phenology and biological control agents of the introduced pine sawfly; to continue development of mass rearing techniques for the gypsy moth parasitoid *Ceranthia samarensis*; to release *Ceranthia* in southern Ontario; to develop a new study to assess the impact of parasitoids on gypsy moth in southern Ontario and to identify new biocontrol agents for introduction; to continue studies in which the egg parasitoid *Trichogramma minutum* is used against the spruce budworm.

FOREST PATHOLOGY RESEARCH

Professional Staff: J.T. Basham (Project Leader), C.E. Dorworth, M.T. Dumas,
S. Takai, R.D. Whitney

Support Staff: W.E. Britnell, R. Broadbent, C.N. Davis, R.N. Irwin,
W.C. Richards

 Objectives

To develop silvicultural and management procedures and biological control methods to minimize the impact of root rot, stem decay and stem deterioration on the forests of Ontario; to determine the relationships between the biology of the various stem, butt and root rot causal fungi and different parameters; to investigate the biochemistry, physiology, and genetics of *Ascochyta blight*, the cause of Sclerotinia canker, and develop control methods; to correlate disease syndromes of each race of *A. blight* with serotype and develop control measures for the European race; to exploit past research on *Ceratocystis ulmi* in regulating toxin production and pathogenicity in wilt and dieback diseases.

 Achievements

Published information on the effects of root rot on growth rate of balsam fir; discovered that herbicide-killed hardwoods were a major contributor of inoculum for *Armillaria* root rot in planted spruce; discovered that *Armillaria* root rot in Ontario is caused by at least four "biological species", the most common being *A. obscura*; isolated several actinomycetes, bacteria and fungi which inhibit the linear growth of several major tree decay fungi; published information on variations in the growth and internal quality of aspen clones in northern Ontario; isolated several *Ascochyta blight* hybridoma cell lines for production of monoclonal antibodies; serotyped 223 isolates of *A. blight*; isolated *A. blight* from trees in New Brunswick used in a differential host-pathogen race inoculation study; screened 25 isolates of *C. ulmi* plasmid DNA and other characteristics.

 Goals for 1986-1987

To identify microorganisms that appear to be most antagonistic to tree decay fungi; to search for more biological species of *Armillaria* in Ontario, and assess their pathogenicity; to publish information on the impact of *Armillaria* root rot in plantations, the rate at which fungi destroy stems of spruce budworm-killed balsam fir, the effect of sap rot on debarking losses during pulp manufacture,

(continued)

and how forest managers can use biological factors to predict the extent of sap rot when considering salvage operations; to evaluate the differential *Ascochyx abietina* host-pathogen race inoculation study and relate canker development to host species; to purify further the hybridoma clones specific to each race of *A. abietina*; to continue screening *Ceratocystis ulmi* plasmids and examine their cerato-ulmin productivity; to study cerato-ulmin biosynthesis by *C. ulmi* at the cellular level.

Forest Utilization Research



ENERGY FROM FOREST BIOMASS

Professional Staff: B.J. Sutherland (Project Leader)

Support Staff: D.J. Kennington

 Objectives

To develop and test prototype equipment for the collection and comminution of forest biomass in the forest; to evaluate the potential of forest biomass as an alternative source of energy.

 Achievements

Undertook a new study to examine the effects of forest land drainage on peat geochemistry, subsidence and water quality and quantity, as part of a larger study to evaluate the effect of drainage on biomass production on wetlands of the Clay Belt of northeastern Ontario; completed reports on the following contracts: The Crabe Combine, Development of a Brushwood Harvester for the Reclamation of Brushlands and the Use of Brushwood Materials as Fuel Stock for Energy Production, Development of the RECUFOR Harvester for Picking up and Comminuting Slash Left on Logging Cutover, and the Logging Residue Processor for the Collection and Comminution of Residues Left at Roadside After Whole-tree Delimbing Operations; undertook a study to quantify the jack pine branch or top biomass recovered by two harvesting systems and the volume of jack pine that may be hauled as full-trees in conventional trailers; undertook a study to assess problems and current technology in the transportation of full trees over long distances on public roads; undertook a study to investigate the use of compaction systems in conjunction with harvesting and transportation of forest biomass.

 Goals for 1986-1987

To undertake an economic analysis of producing biomass fuel wood in Canada by means of two systems: the Logging Residue Processor and the Crabe Combine Brush Harvester; to transfer to potential users the technology developed thus far; to continue the study on effects of forest land drainage on peat geochemistry, subsidence and water quality and quantity and on the production of biomass from wetlands in northeastern Ontario.



Forestry Services

FOREST INSECT AND DISEASE SURVEY

Professional Staff: G.M. Howse (Unit Head), H.L. Gross, J.H. Meating, D.T. Myren, K. Nystrom, D.B. Roden, P.D. Syme

Support Staff: M.J. Applejohn, W.D. Biggs, H. Brodersen, D.C. Constable, E.J. Czerwinski, C.N. Davis, H.J. Evans, C. Handfield, W.A. Ingram, V. Jansons, A. Johnston, C.G. Jones, A.J. Keizer, H.D. Lawrence, L.S. MacLeod, R.K. McCron, S. Payne, R.J. Sajan, B.E. Smith, M.J. Thomson.

Objectives

To provide information on the kind, severity, extent and impact of insect and disease problems in Ontario; to provide forest managers with information needed for decision making on control operations; to advise and assist the province in planning and evaluating control operations; to improve procedures used in insect and disease surveys and assessments; to elucidate the bionomics of little-known forest pests.

Achievements

Conducted aerial and ground surveys of the incidence of, and damage caused by, major forest pests in Ontario, identifying nearly 3,565 insect and 1,500 disease samples and answering about 2,100 inquiries; conducted special surveys of pest problems in plantations, seed orchards, seed production areas, provincial and national parks and high-value commercial timber stands; assessed provincial trials and spraying operations against spruce budworm on 29,000 ha, against jack pine budworm on 220,000 ha and against gypsy moth on 170 ha; began or continued studies of the effects of specific insects or diseases on tree health.

Goals for 1986-1987

To conduct annual surveys of, and report on, major forest pest problems in Ontario; to complete the manuscript of Tree Diseases of Eastern Canada; to conduct surveys for pests of white pine and black spruce plantations, seeds and cones; to participate in an early warning system for acid rain by monitoring damage caused in Ontario forests; to assess spraying operations conducted against spruce budworm, jack pine budworm and gypsy moth.

FOREST RESOURCES DATA

Professional Staff: J.H. Smyth (Project Leader)

Support Staff: K.L. Campbell

Objectives

To provide forestry statistics required by the federal government in planning its programs and fulfilling its forestry obligations.

Achievements

Published report of forest management expenditures in Canada for the period 1977-83; completed draft report of forest tree production centres in Canada for 1984; completed draft report on taxes and timber fees generated by the Ontario forest sector; updated and expanded computerized forestry statistical base for Ontario; undertook to collect, computerize and convert the Ontario forest inventory for purposes of national reporting of Canada's forest resources; completed two quarterly reports on selected economic indicators for Ontario.

Goals for 1986-1987

To publish reports on forest tree production centres in Canada, taxes generated by the Ontario forest sector, and a compendium of selected forestry data for Ontario; to meet national obligations for forest inventory and selected forest management data, and respond to requests for regional information from federal and provincial government agencies and the private sector.

LIAISON, DEVELOPMENT AND TECHNICAL SERVICES

Professional Staff: C.R. Smith (Project Leader), J-D. Leblanc, B.J. Sutherland

Support Staff: F.F. Foreman, D.J. Kennington, J. Richenhaller, F.W. Curtis

Objectives

To undertake, on behalf of the Centre, activities not directly related to existing forestry or environmental programs; to provide advisory, operational and technical support services to research staff and other agencies.

Achievements

Prepared a forest management plan for Canadian Forces Base Borden; continued development and maintenance of the GLFC Arboretum; maintained jack pine Christmas tree research investigations; provided advisory and technical services to researchers at GLFC; continued operation of the public forest ecology trail.

Goals for 1986-1987

To begin implementation of CFB Borden forest management plan; to maintain jack pine Christmas tree research; to operate the forest ecology trail.

ECONOMIC STUDIES AND DEVELOPMENT

Professional Staff: J.H. Smyth (Project Leader), S. Andersen, J.D. Johnson

Support Staff: A.J. Brownwright, K.L. Campbell

Objectives

To study the economic aspects of forest management and industry issues; to provide input into federal policy initiatives in forest management and forest industry development; to provide for the effective and efficient program delivery of federal-provincial forestry agreements; to provide economics input into program and project evaluation at GLFC and elsewhere in the Department; to provide advice to other federal departments, provincial government agencies, and private industry development that are beyond the scope of current GLFC programs.

Achievements

Completed draft manuscript of Ontario's pulp and paper industry and analysis of value-added in the Canadian forest industries; published reports on the corporate ownership structure of Ontario's pulp and paper industry, the medium-term outlook for the Ontario newsprint industry, and backlog treatment as a means of reducing costs of delivered wood in northern Ontario; undertook major study to quantify the impact of spruce budworm on the timber supply of a geographically specific forest area; reviewed proposals submitted under the Canada-Ontario Forest Resource Development Agreement (COFRDA) through membership on the Technical Advisory Committee; cooperated in preparing framework for evaluation of COFRDA; prepared Operational Plan documentation for GLFC.

Goals for 1986-1987

To continue model development and analysis of spruce budworm impact on timber supply in a selected forested area of northwestern Ontario; to prepare a paper on the economic and biological aspects of strip cutting in comparison with traditional clear cutting; to continue work on the COFRDA Technical Advisory Committee and Evaluation Subcommittee; to begin a study on the impact of structural changes in the Ontario forest industry over the past decade.

Forestry Development

DEVELOPMENT AGREEMENTS

Professional Staff: D.W.J. McGowan (Project Leader), A.J.F. Ballak, R.L. Macnaughton, H.L. Jääskeläinen, W.B. Wiltshire, R.M. Greet

Objectives

To cooperate fully with OMNR in the management and administration of COFRDA and to monitor progress and expenditures; to ensure adequate federal participation in public relations activities connected with COFRDA.

Achievements

Completed the final year of the Forest Management Subsidiary Agreement (FMSA); published a brochure outlining the major accomplishments of the FMSA; began the interim evaluation of COFRDA; implemented procedures and systems for monitoring and assessing COFRDA; maintained relations with outside agencies and the private sector; continued development of information and management systems for COFRDA; continued participation in COFRDA technical committees.

Goals for 1986-1987

To complete a final report for the FMSA; to manage COFRDA effectively through cooperation with OMNR and private sector agencies; to complete the electronic information management support system for COFRDA; to maintain the field monitoring program in support of COFRDA.

EMPLOYMENT STIMULATION

Professional Staff: D.W.J. McGowan (Project Leader), A.J.F. Ballak, R.L. Macnaughton, H.L. Jääskeläinen, W.B. Wiltshire, R.M. Greet

Objectives

To provide job opportunities in the forest sector that will maximize the training and employment benefits of the participants and support the overall thrust of the Forest Sector Strategy for Canada.

Achievements

Through the Job Development program, approved a total of 56 projects providing 14,000 weeks of work for some 600 participants; completed and published the final report for the Environment 2000 program.

Goals for 1986-1987

To continue implementation of the Job Development program until completion of the final project and to prepare a final report on the program; to participate in any new employment stimulation programs so as to maximize both the employment and forestry benefits.

**Administration,
Financial Services and
Property Management**



ADMINISTRATION, FINANCIAL SERVICES
AND PROPERTY MANAGEMENT

Staff: M.J. Parent, Regional Manager, Management Services
T. Ames, E. Baxter, C. Bodley, W. Borland, Y. Chartrand, W. Clarke,
L. Cormier, D. Evoy, D. Gair, J. Graham, R. Graham, C. Halliday, J.
Heatley, A. Jones, J. Kimball, J. Lang, J. Longo, J. Logtenberg, B.
MacKay, B. McBain, G. McLeod, M. Mills, R. Moffatt, E. Morningstar,
C. Novick, J. Novick, K. Pelletier, M. Pinder, D. Reid, L. Rouse, M.
Skouris, D. Sloan, B. Smith, M. Stone, J. Theriault, D. Weeks, A.
Zurby

Objectives

To provide administrative and financial services for GLFC and to operate and maintain the physical plant and grounds.

Achievements

Completed the Materiel Management Information System (MMIS) and tested the initial prototype; completed development of the Fleet Management Information System and distributed it to all other CFS establishments for implementation; completed upgrading of the Insectary buildings on schedule and on budget; completed computerization of the schedule maintenance programs in the physical plant.

Goals for 1986-1987

To implement a CFS Financial Management Information System to enhance and improve reporting and budgetary controls; to carry out an in-depth review of the fleet operation and study alternatives in order to reduce costs; to review all activities under Finance, Administration and Physical Plant, to recommend and implement changes that will increase efficiency, to improve services and reduce costs.

**Biometrics and Applied
Software Service and Computing
Facilities and Services**

BIOMETRICS AND APPLIED SOFTWARE SERVICE AND
COMPUTING FACILITIES AND SERVICES

Professional Staff: N.I. Bailey, D.W. Beilhartz (Supervisor, Biometrics),
J.E. Field (Supervisor, Computing Facilities), I.M-J. Kwein

Support Staff: D.M. Grave

Objectives

To provide complete biometrics services, including advice on all aspects of data gathering, assistance in data entry, scientific data processing and analysis, and training of staff in the use of software packages; to acquire and maintain software packages; to plan and maintain the computer system, related equipment, system software and communications facilities; to provide advice on and acquire microcomputers and equipment interfacing with the central computer; to provide technical support for and training on computing and communications facilities; to provide computer graphics services.

Achievements

Provided consultation services in experimental design, statistical data analysis, software use and development of computer applications; developed computer applications including a system for converting OMNR inventory data to a national format, a prototype of a materiel management information system, a production version of the fleet management information system, user requirements for a management information system for monitoring and reporting on COFRDA, and a tool information system for the mechanization of silviculture project; installed new major software packages (SAS, a statistical analysis system, and INGRES, a data management package); coordinated training programs in data manipulation and the use of microcomputers by staff; installed 26 terminals, 16 printers, 15 microcomputers, 2 word processors and 1 line printer; provided computer graphics output service and advice to staff on the use of computing facilities.

Goals for 1986-1987

To continue consulting services in experimental design, statistical data analysis, software use and development of computer applications; to complete development of computer applications as outlined above; to distribute the fleet management information system to other CFS establishments; to initiate development of new com-

(continued)

puter applications including automation of library services; to promote further use of microcomputers in management; to provide training as required; to replace the current computer processor with a more powerful one; to acquire new computer terminals, microcomputers, word processors and printers; to install newly acquired software packages and update current ones; to set up a general terminal room, complete installation of data communications and relocate the current computer system facilities; to manage voice/data communications systems; to increase graphics facilities by acquiring digitizing, plotting and display peripherals and development/production software; to replace outmoded peripherals with efficient, higher-capacity equipment; to continue to provide operation, maintenance and management of computer and data communications facilities and advice on the operation of these facilities.

**Research and Technical
Support Services**

RESEARCH AND TECHNICAL SUPPORT SERVICES

Staff: M. Laporte (Greenhouse Technician), J.R. Ramakers (Chemical Analysis Laboratory Technician), E.R. Rayner (Photographer)

Objectives

To provide efficient and economical research and technical support services to GLFC.

Achievements

Expanded greenhouse services to staff by building a new production greenhouse and an enlarged outdoor stock-holding area under Phase I of the GLFC/FPMI expansion; installed additional ventilation and an automatic internal shading system in the new greenhouse in an attempt to resolve summer overheating problems; analyzed 1593 soil samples, 853 plant tissue samples and 248 water samples in the Analytical Services Laboratory, for a total sample load of 2694 samples and analyzed each for an average of five constituents, for a total of 13,470 determinations; provided photographs and photographic services in the photography unit as well as supplies and technical advice for a variety of meetings; made increased use of video recording.

Goals for 1986-1987

To maintain greenhouse services; to cultivate and maintain decorative plants for display throughout the expanded GLFC/FPMI complex; to install a new steam generator for the greenhouse humidification system; to continue to provide inorganic analytical services; to install a new centrifuge in the Analytical Services Laboratory and to implement new chemistries for boron, molybdenum and silicon determination in soil and plant tissue samples; to provide photographic and video services; to provide photographic input into the updating of GLFC audio-visual programs.



Communications Services



COMMUNICATIONS SERVICES

Professional Staff: C.A. Plexman (Chief), S.B. Hurt, L.J. McCormick, D.A. Ortiz

Support Staff: N.J. Dukes, P. Jakibchuk, D.J. Kennington, D.L. Murphy, M.K. Rouse

 Objectives

To publish and disseminate scientific and technical information issuing from GLFC's research program in response to the needs of provincial and industrial forest managers; to promote an understanding of the wide use of forest resources among the general public; to promote public awareness, appreciation and understanding of Canada's forested environment through personal experience; to co-operate with the provincial government in implementing the communications activities outlined in the Canada-Ontario Forest Resource Development Agreement (COFRDA); to promote the research and development activities of GLFC among all sectors of the public.

 Achievements

Published over 100 scientific papers and reports, three issues of the Forestry Newsletter, three issues of the Survey Bulletin and assisted in production of the Mechanization of Silviculture Newsletter; issued news releases and held news conferences; published two leaflets in the GLFC leaflet series; hired an Information Officer to deal with local information needs and news media relations on a permanent basis and another on a term basis to assist in implementing the COFRDA communications program; published the text of the Agreement and a brochure describing highlights of it; formed a committee to plan and carry out activities for the Official Opening of the extension of the forestry complex; published a biographical booklet of staff and the 1984-85 Program Review; set up a contract with the Ontario Forestry Association to provide a number of items for National Forest Week; designed a display highlighting the program at GLFC; produced and exhibited a display on the COFRDA program; updated the summer tour program, conducted tours twice a day during the summer and as required at other times; began to update the technical and general audio-visual programs on GLFC; incorporated library services into the Communications Unit; purchased a personal computer for the Unit, trained staff in its use, and computerized a number of files and records; relocated in new facilities as part of the GLFC expansion program; opened and maintained the forest ecology trail for the public; continued the arboretum planting program.

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Goals for 1986-1987

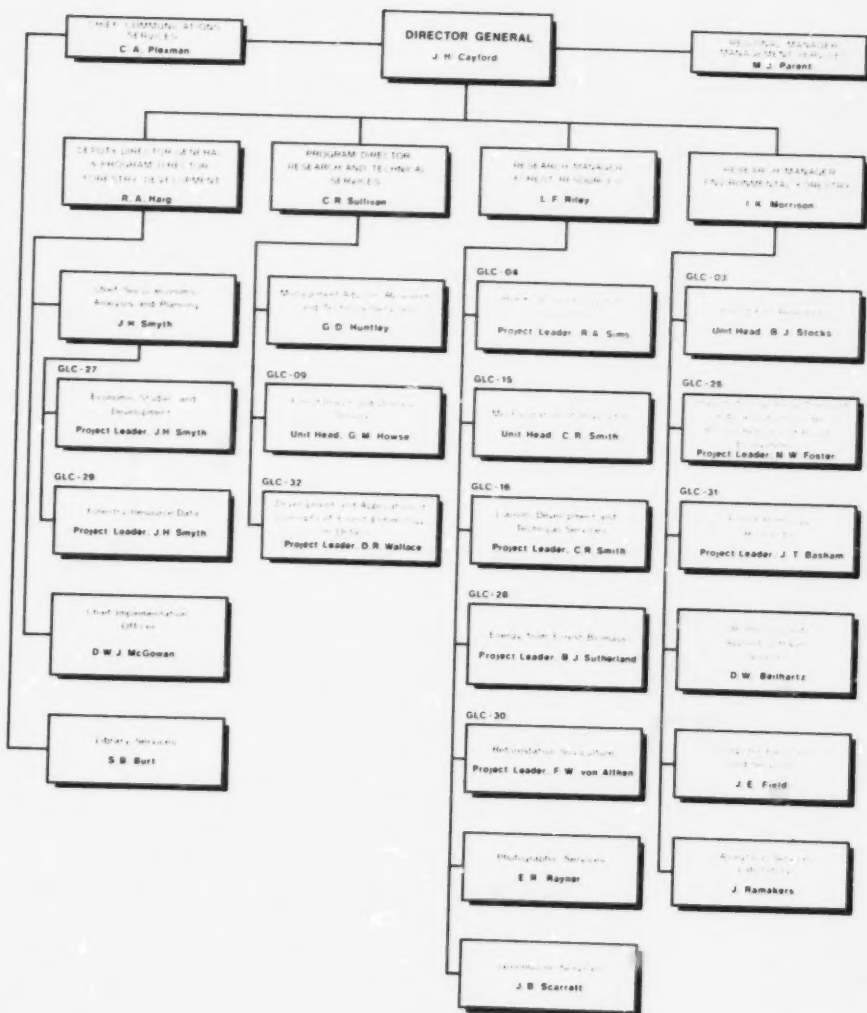
To publish and disseminate scientific papers and reports as required, four issues of the Forestry Newsletter in a new format, and three issues of the Survey Bulletin, and to continue assisting with production of the Mechanization of Silviculture Newsletter; to issue news releases as required; to publish biographical sketches of staff and the 1985-86 Program Review; to continue the summer tour program and expand the tour program for special interest groups; to implement the communications program of COFRDA; to expand contacts within the forestry community and contacts with the news media; to complete updates of the technical and general audio-visual programs on GLFC; to hold the Official Opening of the GLFC extension and an Open House for the general public; to complete the display on GLFC programs; to promote National Forest Week and other forestry-related events; to maintain the forest ecology trail; to initiate plans for the Official Opening of the arboretum and accelerate the planting program; to participate in the National Forestry Awareness program.

Appendices



GREAT LAKES FORESTRY CENTRE

PROGRAM ORGANIZATION



EXPENDITURES
(\$'000)

Project	Person years	Salaries	Operations and maintenance	Capital	Grants and contributions	Other operating & maintenance	Total
<u>Forest Environment Research</u>							
Impact of Long-range Transport of Air Pollutants on the Bio- geochemistry of Forest Eco- systems	8.8	291.8	117.1	85.0			493.9
<u>Forest Production Research</u>							
Black Spruce Ecosystem Silviculture	13.0	469.9	66.3	79.4			615.6
Mechanization of Silviculture	6.0	224.8	26.3				251.1
Reforestation Silviculture	10.0	341.1	43.0	11.6			395.7
<u>Forest Protection Research</u>							
Forest Fire Research	6.0	222.0	44.2	3.6			269.8
Forest Pathology Research	9.2	420.4	42.2	34.3			496.9
Development and Application of Concepts in Forest Entomology in Ontario	12.0	443.0	72.9	22.5			538.4
<u>Forest Utilization Research</u>							
Energy from Forest Biomass	.5	20.0				29.1	49.1
<u>Forestry Services</u>							
Forest Insect and Disease Survey	27.0	929.6	140.6	14.8			1,085.0
Forest Resources Data	1.0	30.6	8.9				39.5
Liaison, Development and Technical Services	1.0	42.0	9.4				51.4
<u>Forestry Development</u>							
Economic Studies and Development	4.4	117.1	11.7	.2			129.0
Forest Resource Development Agreement	8.1	227.6		41.1	10,577.1	250.4	11,096.2
Forest Management Subsidiary Agreement	4.0	171.9	7.9		5,434.2		5,614.0
Employment Stimulation	4.1	112.9				13.1	126.0
Management	8.0	315.7	86.6				402.3
Administration, Financial Services and Property Management	43.6	1,009.5	1,156.4	405.6			2,571.5
Communications Services	7.5	173.5	98.6				272.1
Research Support Services	9.0	304.1	82.0	52.8			438.9
TOTALS	183.2	*5,867.5	**2,011.8	750.9	16,011.3	292.6	24,934.1

*CUSEP services not included

122.2

**PRUF contracts and unsolicited proposals not included

159.6

CONTRACTS LET OR SUPERVISED BY THE GREAT LAKES FORESTRY CENTRE
FOR THE YEAR 1985-86

Contractor's Name	Contract Title	Contract Amount	Paid 1985-86
Art Jalkanen	Collection of Soil and Water Samples in Northern Ontario	\$2,850	\$2,763
University of Waterloo	Analysis of Research Data	7,296	7,296
H.G. McPhee	To Evaluate the Suitability of Eight Provenances of Jack Pine	1,500	1,500
University of Laval	A Written Report of the General Nature of Mycorrhizae	7,600	7,600
Scott Capell	Processing and Digestion of Plant Material Samples for Analysis	4,000	4,000
Ahmed Haws	Data Transfer and Analysis	3,450	3,450
David Thomas	Analyze Data Files on Vax Computer and Prepare Samples for Chemical Analysis	3,400	3,400
UP-Z-174	Contrôle Non-chimique des Insectes Défoliateurs des Boises Forestières et Urbaines	2,000	2,000
PERIC UP-136	Design, Fabricate and Assemble Modifications to a Research Concept Machine	49,176	10,000
University of Toronto	Manipulation of the Host Pathogen Systems to Control Armillaria Root Rot	59,000	19,372
University of Saskatchewan	Development of an Active Seat Suspension System for Off-road Forest Vehicles	175,777	56,042
University of Toronto	Influence of Cold Soil Temperature on Water Relations and Seedlings	32,593	32,593
University of Guelph	Seasonal Variations in the Tolerance of Two Conifer Species to Herbicides	13,784	13,784
University of Toronto	Competitive Suppression of Conifer Seedlings by Other Plant Species	24,610	24,610
Elms Design	Lease Agreement for Rental of a Univo-Contract Carrier to be Used in the Contract Titled "Fabrication, Qualification, Assembly and Shop Testing..."	49,737	11,053
Graham C. Orr	Collection of Data on a Peatland Drainage Site 25 km E. of Cochrane, Ont.	4,225	4,225

(continued)

CONTRACTS LET AND SUPERVISED BY THE GREAT LAKES FORESTRY CENTRE
FOR THE YEAR 1985-86 (concluded)

Contractor's Name	Contract Title	Contract Amount	Paid 1985-86
Matcam Forestry Consultants Inc.	Direct Seeding of Black Spruce on Upland Sites in Northwestern Ontario	45,000	45,000
ASL Forest	Investigate Planting Stock Quality and Study the Adaptation of Conifer Seedlings to Site	149,061	49,667
Horton Forestry	Stand Structure and Development in Second-growth Black Spruce Forests	140,270	41,118
Mark Browning	Mycorrhiza Development in Container Seedlings	208,700	7,042

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